UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/702,320	11/05/2003	James M. Prober	CL1665USNA	3039

23906 7590 06/02/2005

E I DU PONT DE NEMOURS AND COMPANY
LEGAL PATENT RECORDS CENTER
BARLEY MILL PLAZA 25/1128
4417 LANCASTER PIKE
WILMINGTON, DE 19805

EXAMINER	
YU, MELANIE J	

ART UNIT	PAPER NUMBER
1641	

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/702,320	PROBER ET AL.	
	Examiner	Art Unit	
	Melanie Yu	.1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-70* is/are pending in the application.

4a) Of the above claim(s) *2,3,5,12,13 and 48-70* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,6-11 and 14-47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's amendment filed 24 March 2005 has been entered. Claims 1-70 are pending in this application. Claims 2, 3, 5, 12, 13 and 48-70 are withdrawn. Claims 1, 7, 31 and 40 are currently amended.

Withdrawn Rejections

2. Rejection of claims 7, 19-31 and 40 under 35 USC 112, second paragraph is withdrawn. Rejection of claim 6 under 35 USC 102(b) is withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 42 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It unclear how the film can prevent non-specific binding and also causes attachment of a capture probe upon activation. It is unclear whether the thin film is specific to a particular type of capture probe.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Yguerabide et al. (US 2003/0096302).

Yguerabide et al. teach a method for the identification of an analyte comprising: providing a light scanning source which produces light over an analytical wavelength (illumination source; par. 0679); providing at least two substantially spherical identifiable

particles (par. 0679; par. 0684); applying at least one capture probe to the particles which binds to the surface of the particle, the capture probe having affinity for at least one analyte (biotintylated, par. 0679; par. 0684); scanning each particle one or more times over a first analytical wavelength range to produce at least one first reference resonant light scattering signature for each particle, the first resonant light scattering signature uniquely identifying each particle (observed with light microscope to obtain scattered light properties, par. 0679; par. 0684; scattered light properties are resonant, par. 0081 because resonance light scattering particles are utilized and would therefore produce a resonant light scattering signature; illuminating includes scanning over a wavelength range, par. 0142; par. 0143; par. 0144); correlating the capture probe with each identified particle (biotintylated the surface, par. 0679; par. 0684); contacting the particle with a sample suspected of containing at least one analyte where, if the analyte is present in the sample, binding occurs between the at least one capture probe and the at least one analyte (streptavidin, par. 0679; par. 0684); scanning the particles one or more times over a second analytical wavelength range to produce at least one second binding resonant light scattering signature wherein the first reference and the second resonant light scattering signature are different, and the first and second analytical wavelengths are the same (light is illuminated under second conditions, par. 0679; par. 0684; scattered light properties are resonant, par. 0081 because resonance light scattering particles are utilized and would therefore produce a resonant light scattering signature); detecting binding of at least one analyte to at least one capture probe by comparing the differences between the first and second resonant light scattering signatures (can be examined on a particle by particle basis, par. 0679; par. 0684, detecting changes in light scattering, par. 0679); and identifying one or more bound analyte on the basis of the correlation

and at the second binding resonant light scattering signature (particles with analyte are identified by their light scattering signature; par. 0641).

5. Claims 1, 4, 8, 11, 16-23, 33, 35, and 45-47 are rejected under 35 U.S.C. 102(b) as being anticipated by Hansen et al. (US 6,200,820) in light of Reed (US 6,618,144).

Hansen et al. teach a method for the identification of an analyte comprising: providing a light scanning source which produces light over an analytical wavelength (col. 7, lines 10-13); providing at least two substantially spherical identifiable particles (col. 7, lines 10-13); applying at least one capture probe to the particles which binds to the surface of the particle, the capture probe having affinity for at least one analyte (col. 8, lines 17-28; col. 9, lines 28-34); scanning each particle one or more times over a first analytical wavelength range to produce at least one first reference resonant light scattering signature for each particle, the first resonant light scattering signature uniquely identifying each particle (col. 9, lines 6-19); correlating the capture probe with each identified particle (col. 9, lines 6-19); contacting the particle with a sample suspected of containing at least one analyte where, if the analyte is present in the sample, binding occurs between the at least one capture probe and the at least one analyte (col. 9, lines 19-22); scanning the particles one or more times over a second analytical wavelength range to produce at least one second binding resonant light scattering signature wherein the first reference and the second resonant light scattering signature are different, and the first and second analytical wavelengths are the same (col. 9, lines 19-30); detecting binding of at least one analyte to at least one capture probe by comparing the differences between the first and second resonant light scattering signatures (col. 8, lines 10-16; col. 10, lines 25-31; col. 11, lines 5-20); and identifying one or more bound analyte on the basis of the correlation and at the second binding resonant

light scattering signature (col. 11, lines 5-20). Although Hansen et al. does not specifically teach an analytical wavelength, any incident light source provides scanning over an analytical wavelength as evidenced by Reed at column 7, lines 12-31. Therefore, the light source of Hansen et al. at column 3, lines 61-62 provide an analytical wavelength range when producing individual light scatter signal for each particle in the illumination step of Hansen et al. at column 3, lines 61-63.

Hansen et al. also teach the analyte identified by analytical methods (col. 11, lines 5-20), and the amount of bound analyte determined by comparing the differences between the first and second resonant light scattering signatures (col. 8, lines 10-16). Hansen et al. also teach the particle being 1 μm (col. 8, lines 44-48), which falls within the recited ranges of 100 μm or less, 75 μm or less, and 50 μm or less.

Regarding claims 19 and 20, Hansen et al. teach a particle comprising a substantially spherical core and one or more layers overlaying the core; wherein the layers are substantially transparent to light over the analytical wavelength (col. 3, lines 45-60; col. 7, lines 47-49; col. 8, lines 57-60), wherein the particles are optically (col. 7, lines 41-43; col. 8, lines 53-55), biologically (col. 10, lines 61-66), and chemically (col. 7, lines 28-34) active.

With respect to claims 33 and 35, Hansen et al. teach both the capture probe and the analyte being antibodies (col. 10, lines 58-67).

Claim Rejections - 35 USC § 103

1. Claims 6, 7, 9, 10, 14, 15, 24-28, 31, 34, and 36-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen et al. (US 6,200,820) in light of Reed (US 6,618,144) in view of West et al. (US 6,530,944).

Regarding claim 6, Hansen et al. in light of Reed, as disclosed above, teach a method for identification of an analyte, but fail to teach the particle scanned over an analytical wavelength range prior to applying the capture probe.

West et al. teach scanning a particle over an analytical wavelength range prior to binding a complex to the particle in order to observe a shift in the wavelength of maximum resonance (col. 28, line 61 – col. 29, line 4)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the method of Hansen et al. in light of Reed, scanning the particle over an analytical wavelength prior to applying the capture probe as taught by West et al., in order to provide compositions and methods having relatively homogeneous structures that do not have to rely on suspension in a particular medium in order to exhibit their desired characteristics and to provide particles and methods for use in diagnostic imaging.

West et al. also teach a particle scanned over the analytical wavelength range prior to applying the capture probe to produce an identifying resonant light scattering signature (surface plasmon resonance; col. 9, lines 15-30; Fig. 1). West et al. also teach a detectable label of a fluorescent moiety (col. 13, lines 2-20).

Regarding claims 7, 14, and 15, West et al. teach the optical wavelength ranging from about 500 to about 1200 nm (Fig. 1), which partially falls within the recited range of 275 nm to about 1900 nm, and an analytical range of about 30 nm (col. 3, lines 4-8), but fail to teach the exact ranges of an analytical window of about 1 to about 20 nm. However, it has long been settled to be no more than routine experimentation for one of ordinary skill in the art to discover an optimum value for a result effective variable. "[W]here the general conditions of a claim are

disclosed in the prior art, it is not inventive to discover the optimum of workable ranges by routine experimentation" Application of Aller, 220 F.2d 454, 456, 105 USPQ 233, 235-236 (C.C.P.A. 1955). "No invention is involved in discovering optimum ranges of a process by routine experimentation." Id. at 458, 105 USPQ at 236-237. The "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." Since applicant has not disclosed that the specific limitations recited in instant claims 7, 14, and 15 are for any particular purpose or solve any stated problem, and the prior art teaches that the optical wavelengths and the range of analytical wavelengths may be varied in order to detect particles that have different optical resonance properties over a wide range of wavelengths, absent unexpected results, it would have been obvious for one of ordinary skill to discover the optimum workable ranges of the methods disclosed by the prior art by normal optimization procedures know in the optical resonance art.

With respect to claim 24, Hansen et al. in light of Reed, as applied to claims 1 and 4, teach a method for identification of an analyte, but fail to teach the particle thickness.

West et al. teach layers being optically (col. 2, lines 25-30), biologically (col. 11, lines 51-57), or chemically (col. 5, lines 8-11) active and having a thickness of 20 nm (Fig. 1; col. 5, lines 38-40), which falls within the recited ranges of 1 nm –10 μm and 1nm – 20μm, in order to control the optical resonance of the particle (col. 9, lines 15-30).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the method of Hansen et al. in light of Reed, a layer thickness as taught by West et al., in order to separate optical resonance signals when detecting multiple analyte within the same sample.

Regarding claims 25-28, West et al. teach a particle comprising a spherical, light absorbing (col. 8, lines 52-54), core (col. 4, lines 56-63) and a layer over the core (col. 4, lines 22-25). West et al. also teach the core being silica (col. 5, lines 36-40) and the layer being metal colloidal particles (col. 27, lines 62-65). West et al. also teach the analyte being an antibody (col. 19, lines 35-39; col. 20, lines 15-22) present in a sample comprising matrix components (col. 30, lines 54-65). West et al. teach the capture probe synthesized on the surface of the particle (col. 30, lines 34-39) and the capture probe isolated from natural sources (isolated from human breast epithelial carcinoma cell line; col. 30, lines 18-24).

With respect to claim 27, West et al. teach a nanoparticle with a shell layer having a thickness from 1 to 100 nm (col. 10, lines 2-4), which partially falls within the recited range of 50 nm to 20 μm.

Regarding claims 41-44, West et al. teach applying the capture probe to the particle when the particle is treated with a thin film to prevent non-specific binding of sample matrix components (col. 30, lines 46-53). West et al. also teach the first or second binding resonant light scattering signatures being peak wavelength amplitudes and the signatures compared on the basis of spectral features of the peak wavelength amplitudes (Fig. 3a and b; col. 5, lines 44-53).

2. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen et al. (US 6,200,820) in light of Reed (US 6,618,144) in view of Becker et al. (US 2003/0015428) further in view of Hayashi et al. (US 5,124,207).

Hansen et al. in light of Reed, as applied to claims 1 and 4, teach a method for the identification of an analyte, but fail to teach a particle wherein the core is magnetic and iron oxide.

Becker et al. teach a particle wherein the core is a magnetic material, in order to have a conducting core (pgs. 16-17, [0209-0211]) in order to achieve a dielectric fingerprint, but fail to teach the magnetic material being iron oxide.

Hayashi et al. teach a magnetic iron oxide particle comprising a magnetic iron oxide core (col. 1, lines 35-40), in order to achieve particles that are fine in size and high in coercive force.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the method of Hansen et al. in light of Reed, a magnetic particle as taught by Becker et al., in order to allow for simultaneous manipulation identification, and detection of different species and for multiple analyte in a fluid sample to be indexed. Furthermore, it would have been obvious to include in the method of Hansen et al. in view of Becker et al., the magnetic material of iron oxide, in order to have particles that are magnetically and chemically stable.

3. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen et al. (US 6,200,820) in light of Reed (US 6,618,144) in view of Becker et al. (US 2003/0015428).

Hansen et al. in light of Reed, as applied to claims 1 and 4, teach a method for the identification of an analyte, but fail to teach a particle wherein the core is hollow.

Becker et al. teach a particle wherein the core is hollow (pg. 4, [0052]) in order to have a conducting core with a dielectric shell so the dielectric properties of the particle can be detected (pg. 19, [0232-0233]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the method of Hansen et al. in light of Reed, a particle with a hollow core as taught by Becker et al., in order to allow for simultaneous manipulation,

identification, and detection of different species and for multiple analyte in a fluid sample to be indexed.

4. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen et al. (US 6,200,820) in light of Reed (US 6,618,144) in view of Finlan (US 5,055,265).

Hansen et al. in light of Reed, as applied to claims 1 and 4, teach a glass particle used in a method for the identification of an analyte, but fail to teach the index of refraction.

Finlan teaches a block made from high refractive index glass with a refractive index typically of 2 (col. 2, lines 46-51), which falls within the recited range of about 1.45 to about 2.1, in order to achieve total internal reflection of a beam from the source at resonance.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the glass particle of Hansen et al. in light of Reed, a refractive index of 2 as taught by Finlan, in order to detect minute changes in the refractive index of the surface as binding occurs.

Response to Arguments

5. Applicant's arguments filed 24 March 2005 regarding rejection of claim 42 under 35 USC 112, second paragraph, have been fully considered but they are not persuasive. Applicant argues the claim is not indefinite because the purpose of the film is to prevent non-specific binding of the sample matrix components and the activation of the coating involves chemical treatment to attach a capture probe. However, this is not specifically stated in the claim and the coating and film appear to be different entities. It is still unclear as to whether the film is meant to activate binding and prevent non-specific binding and how the film can both promote and prevent binding.

6. Applicant's arguments with respect to the rejection of claims 1, 4, 6, 8, 11, 16-23, 33, 35 and 45-47 under 35 USC 102(b) have been considered but are moot in view of the new ground(s) of rejection.

Regarding Applicant's arguments against Hansen et al., Applicant argues the method described by Hansen produces light at discrete wavelengths and cannot scan over an analytical wavelength. However, since no wavelength range is recited in claim 1, an analytical wavelength range encompasses a single wavelength and Applicant states Hansen scans at single, discrete wavelengths. Furthermore, an analytical wavelength range encompasses a plurality of discrete wavelengths over which the sample is scanned. Additionally, as evidenced by Reed above, an incident light source taught by Hansen provides a range of wavelengths during an illumination step in order to obtain a light scattering signature.

Applicant also argues that Hansen do not describe obtaining first or second resonant light scattering signatures or comparison of first and second light scattering signatures. However, claims 1 and 4 do not recite a light source specific for producing resonant light, and therefore the light scanning source of the instant application encompasses the light source of Hansen provided in part (a) of claims 1 and 4. Furthermore, the resonant phenomenon of the instant applicant appears to be the same phenomena as that of Hansen because Hansen teaches the recited steps. Additionally, Hansen obtains the same peak width signature as that in the instant application recited in claim 43. Therefore, resonant light scattering is interpreted as a light scattering signature obtained by the method of claim 1 or 4, wherein the method is capable of obtaining any of the signatures recited in claim 43, including peak widths. Therefore, as described above,

Hansen also describes comparing the differences between the first and second resonant signatures.

Applicant further argues that Hansen does not describe uniquely identifying each particle and correlating the capture probe with each identified particle. However, applicant does not recite the resonant light scattering signature must be unique for each particle. Therefore, each particle in the class of particles of Hansen is uniquely identified. Furthermore, Hansen teaches producing a unique signature for each particle, which provides unique identification of each particle (individual light scatter signals for each of the non-colloidal particles, col. 3, lines 62-63).

Applicant argues that the colloidal particles used by Hansen are not transparent to light because they do not absorb light of the wavelength used. However, since the light scatter pulse height of the colloidal particles is significantly lower than that of the microspheres, the colloidal particles are considered substantially transparent because they are not detected.

7. Applicant's arguments filed 24 March 2005 regarding rejection of claims 7, 9, 10, 14, 15, 24-28, 31 and 36-44 under 35 USC 103(a) have been fully considered but they are not persuasive. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Hansen teach scanning the particle over an analytical wavelength range, but

fails to teach scanning over a range prior to applying a capture probe. Therefore, Hansen does not already comprise the limitation taught by West.

Applicant argues the method of West does not teach resonant light scattering because the method relates to surface plasmon resonance. However, Applicant recites surface plasmon resonance as an analytical method for resonant light scattering signatures. Therefore, the light scattering signatures in the method of West are resonant light scattering.

8. In response to applicant's arguments against the references of Hansen and West, Hansen and Becker and Hayashi, Hansen and Becker, and Hansen and Finlan, individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie Yu whose telephone number is (571) 272-2933. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Melanie Yu
Patent Examiner
Art Unit 1641

LONG V. LE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600
05/26/05